CLAIMS

1. A breathing gas supply system (10) for supplying breathable gas in an aircraft (A) including an oxygen enriching apparatus (12) which is operable in at least two modes to provide product gas with varying oxygen concentrations, a first feed line (22) to feed more highly enriched product gas to one or more breathing gas outlets (17), and a second feed line (24) to feed less highly enriched product gas for breathing, and a control means (30) to control the oxygen enrichment apparatus (12) to provide highly enriched product gas to the breathing gas outlet or outlets (17) in the first mode of operation or less highly enriched product gas for breathing, and to control a diverter valve (20) which directs the product gas to the respective feed line (22, 24).

2. A system according to claim 1 wherein in the first mode of operation the more highly enriched product gas is fed to a plurality of gas outlets (17), and in the second mode of operation the less highly enriched product gas is fed to an aircraft cabin (11) for breathing during normal high altitude flight.

3. A system according to claim 1 or claim 2 wherein the oxygen enriching apparatus (10) includes a plurality of molecular sieve beds (12) which are operable cyclically to adsorb non-oxygen gas during a charging phase to produce product gas for breathing, and de-adsorb non-oxygen gas to atmosphere during a venting phase to clean the bed of non-oxygen gas, the product gas produced in the second mode of operation having about a 40-60% oxygen concentration and more particularly about 50%, whilst the product gas produced in the first mode of operation has about a 70-90% oxygen concentration, and more typically about 80%.

4. A system according to claim 2 or claim 3 where dependent upon claim 2 wherein the product gas produced in the second mode of operation is diluted for use by being diluted for use with recirculated cabin (11) air prior to introduction into the cabin (11) for normal breathing so that the oxygen concentration of the air breathed normally in the cabin (11) is not significantly greater than that of ambient air.

5. A system according to claim 3 or claim 4 where dependent upon claim 3 wherein the oxygen enriching apparatus (12) includes N molecular sieve beds and in the first mode of operation X beds are operated to produce the highly enriched product gas at a flow rate of Y, where X<N, and in the second mode of operation all N beds are operated to produce the less highly enriched product gas at a flow rate Z, where Z is greater than Y.

6. A system according to claim 5 wherein the control means (30) is capable of switching the oxygen enriching apparatus (12) between operating modes and of optimising use of the oxygen enriching apparatus (12) when operating at less than maximum demand.

7. A system according to claim 6 wherein the control means (30) is programmed to select X of the N molecular sieve beds (12) to operate when less than the maximum demand is required to be fulfilled, and an operating cycle to operate those selected beds.

8. A system according to claim 5 or claim 6 wherein in the second mode of operation, all N beds are operated, and each bed is operated in sequence with a charge to vent ratio of about 1:N.

9. A system according to any one of claims 5 to 7 wherein in the first mode of operation when X of the N beds is operating, each of the X beds is operated in sequence with a charge to vent ratio of about I:X.

10. An aircraft (A) including a breathing gas supply system (10) according to any one of the preceding claims.

11. A method of operating a breathing gas supply system (10) according to any one of claims 1 to 9 including providing more highly enriched product gas to the one or more breathing outlets (17) in a first operating mode and providing less highly enriched product gas for breathing in a second operating mode.